

420-ENH-MT

Introduction to Mobile Programming

Course 1

Introduction

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Cégep de la Gaspésie et des Îles

Overview

- What is a Mobile Application?
- Why Develop Mobile Applications?
- Challenges of Mobile Application Development
- Mobile Application Development Tools
- Ad-hoc Development
- Mobile Application Engineering Model



Mobile Apps.
The Next Big Thing
for Business.

Restrooms Telephones

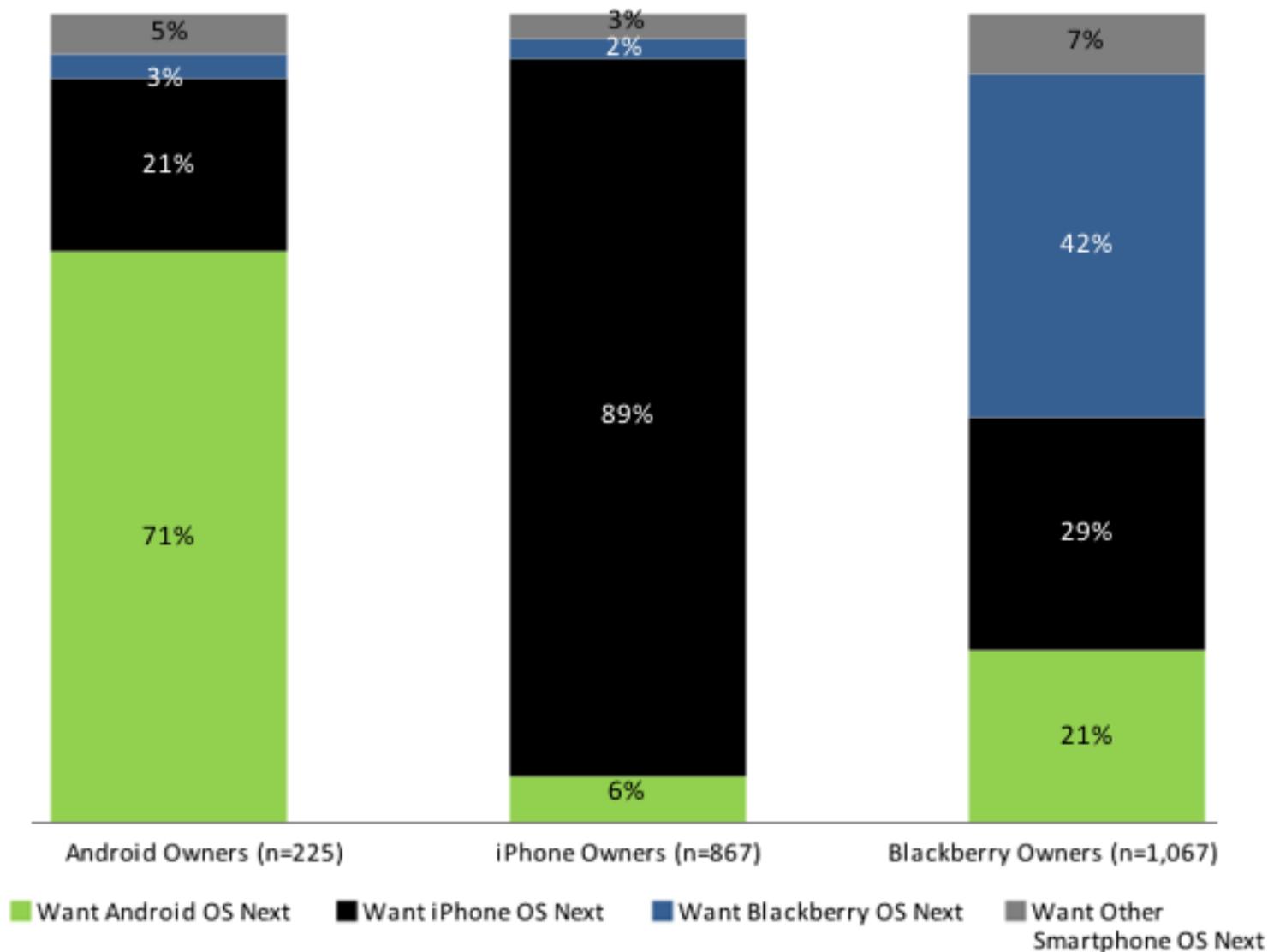


Mobile: What's Happening?

- Proliferation of Smartphones
- Global access to the Internet
- Convergence of B2B & B2C - B2E
- Divergence of .com & apps, devices, O/S
- Need to increase utilization of data
- Focus on Information at the Point of Performance

Next Desired Smartphone OS

Q2 2010, Likely Smartphone Upgraders, National, US

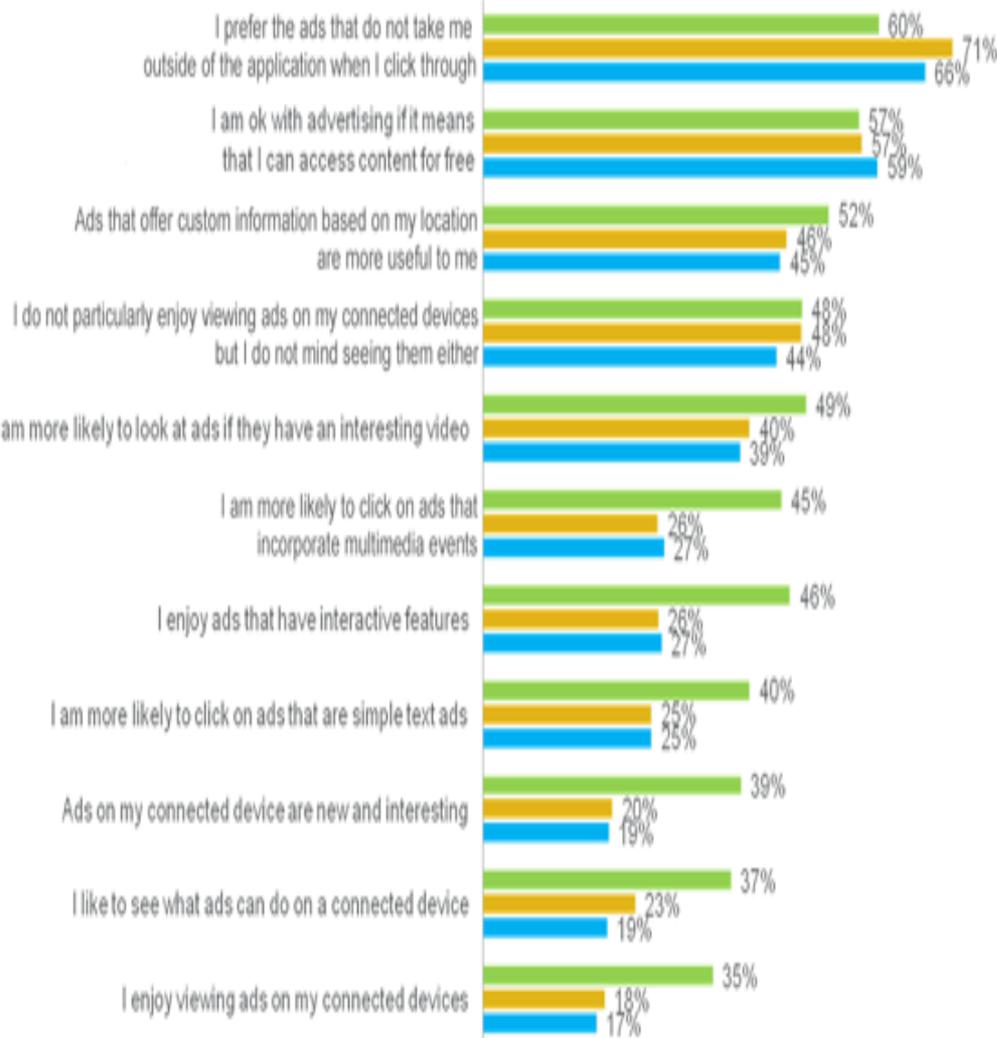


Source: The Nielsen Company

iPad users are the most receptive to advertising

Receptivity to Advertising

■ Apple iPad ■ Apple iPhone ■ All Connected Device Owners

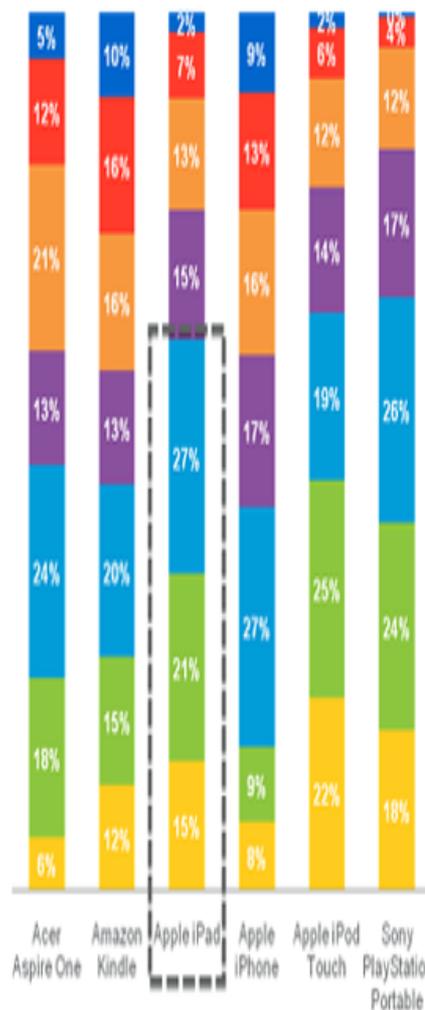


Source: The Nielsen Company

The iPad skews younger and male

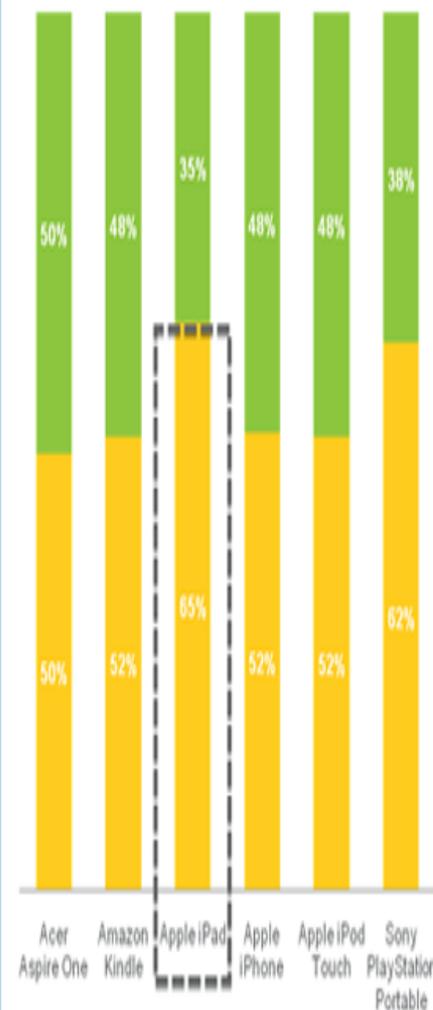
Age

■ <18 ■ 18-24 ■ 25-34 ■ 35-44 ■ 45-54 ■ 55-64 ■ 65 years and older



Gender

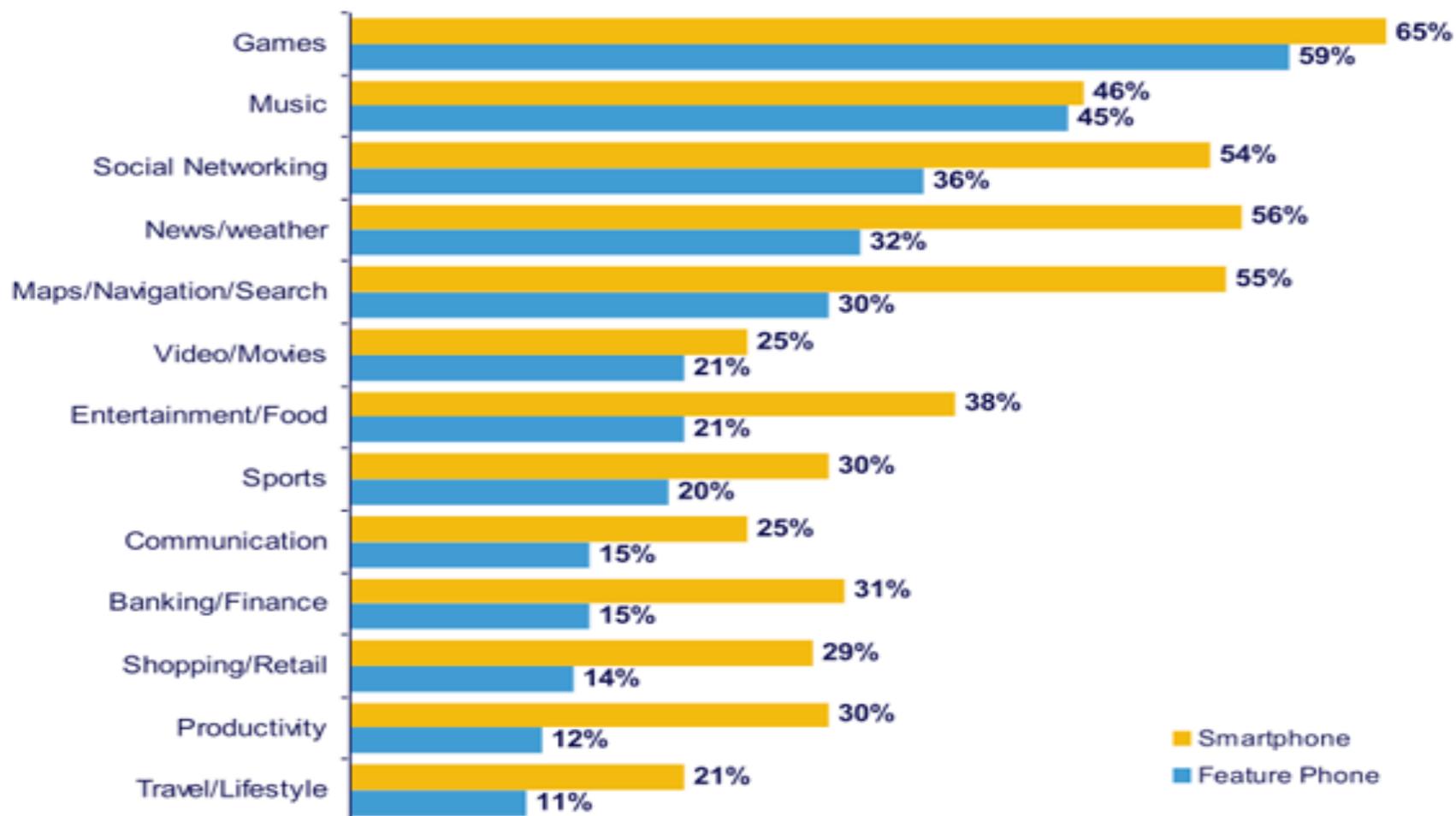
■ Male ■ Female



Source: The Nielsen Company

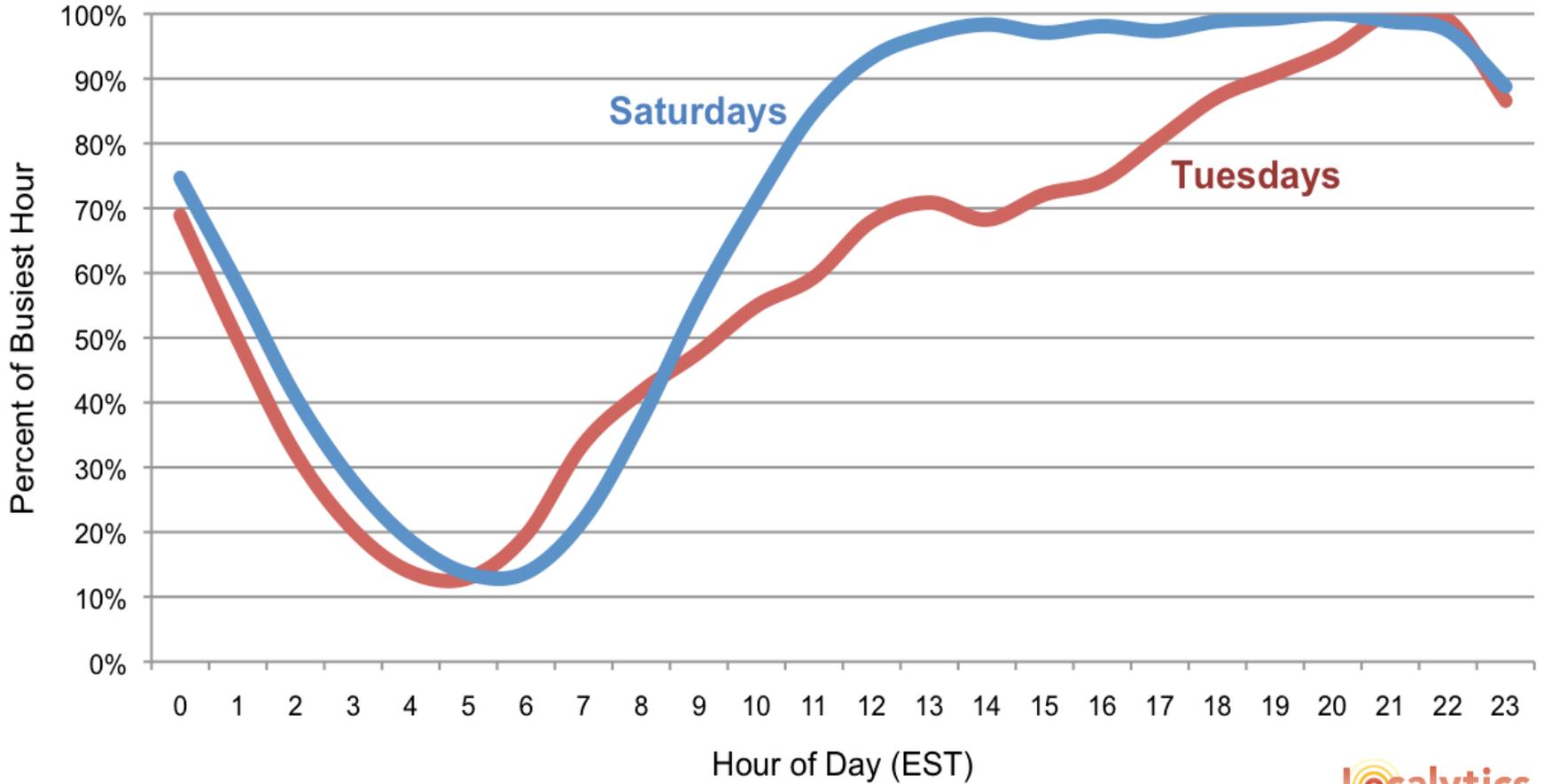
Categories of Applications Used in the Past 30 Days

Past 30 Day App Downloaders



Base: Feature Phone (n=1,914), Smartphone (n=2,351)

iPhone Application Usage



Proliferation of platforms will drive mobile application sales growth up 3800% to \$30B in the next three years

Number of people who access information

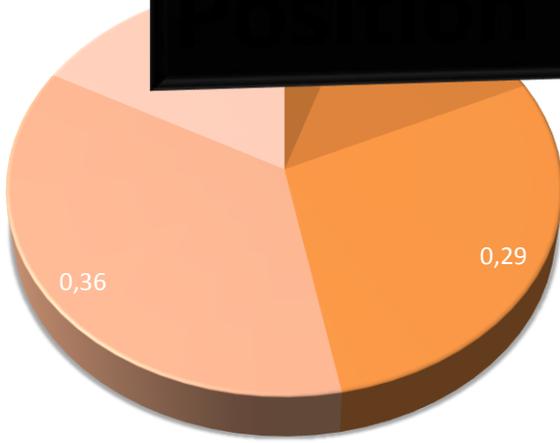
Gartner Says Android to Become No. 2 Worldwide Mobile OS by 2012

User

Ente

2012

2010



-
-
-
-
-

75% of Android users are male
57% of iPhone users are male

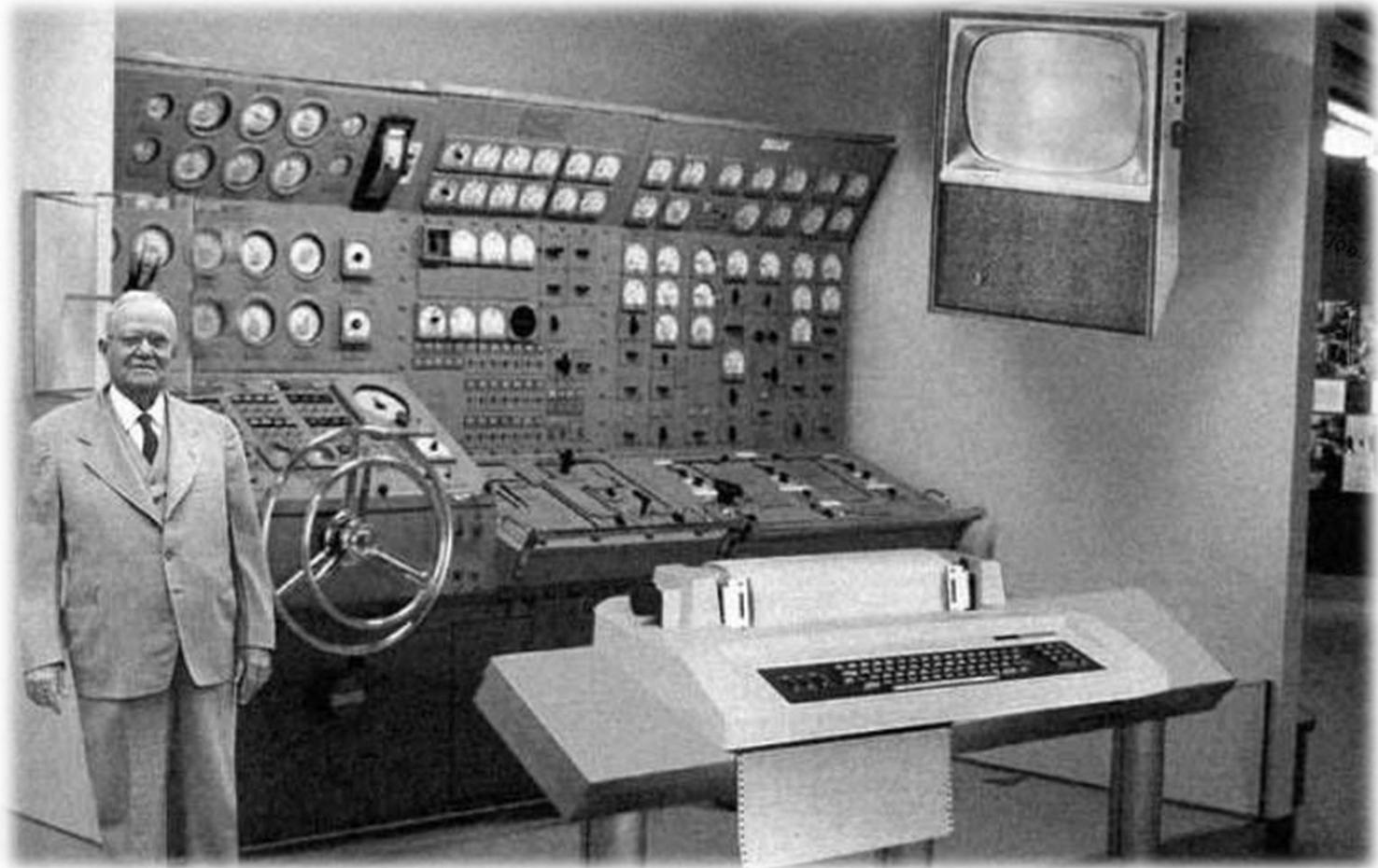
What's Your Next Big Thing?



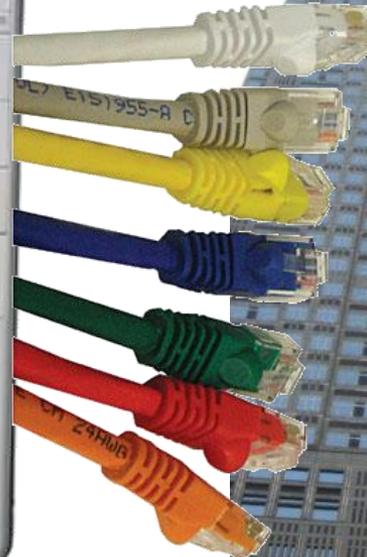
Information at the Point of Performance



What is a “mobile solution?”



What is a “mobile solution?”



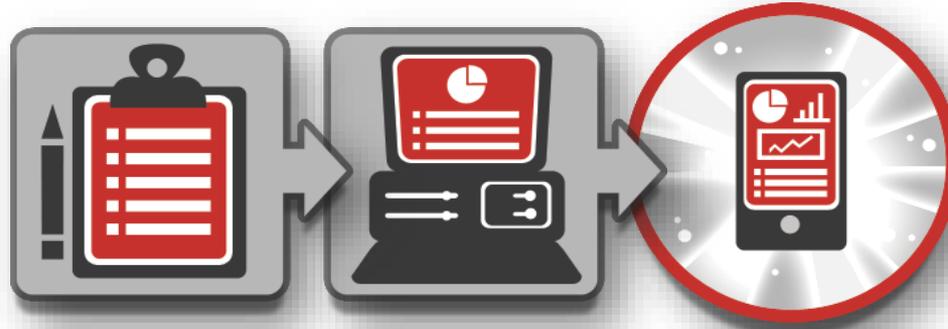
At Issue

Multiple systems to mobile devices

Disseminate information

- Relevant, timely
- Anywhere, anytime
- Appropriate for targeted user
- Maximized for capabilities of the device

Mobile App is Ahead of the Curve



Evolution of application
creation and adoption



Isolated
Applications

Home
Grown
Systems

Customized
Systems

Suites
(SAP, Oracle)

Product Philosophy

- User Experience matched to the device
- Dashboard guidance
- Amazing, Productive Apps
- Beneficial, Compelling Functionality
- Support the functional process
- Leverage capabilities of Consumer Grade devices

To MEAP or not to MEAP...

Mobile Enterprise Application Platform

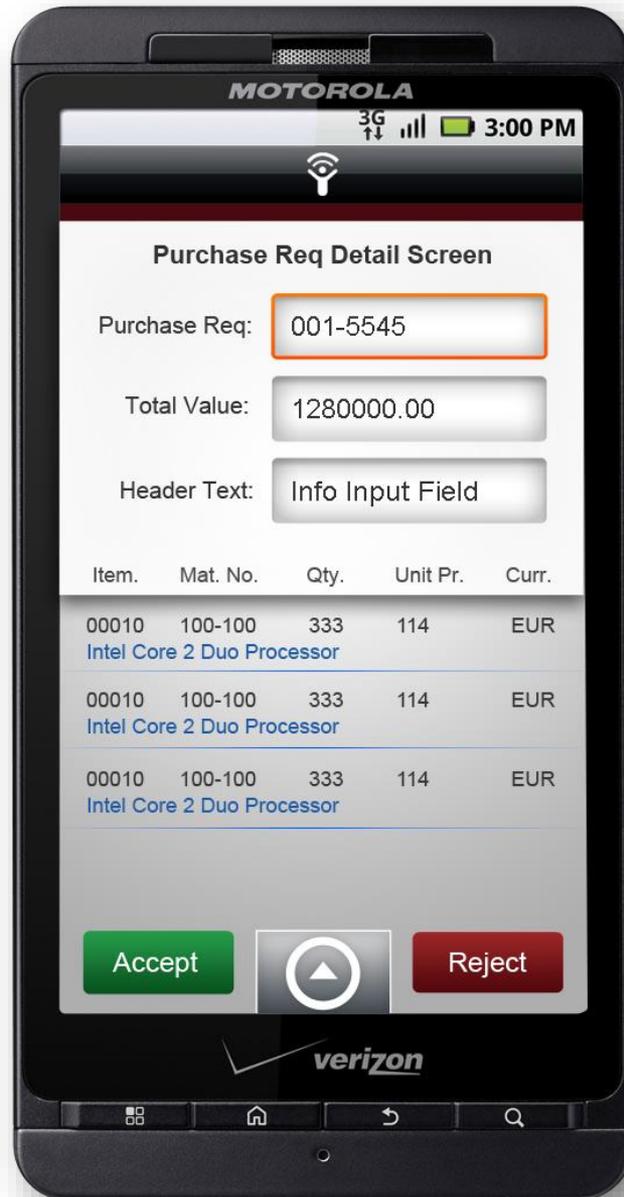


**Take the perspective of
the mobile user looking
into the back office...**

the Point of

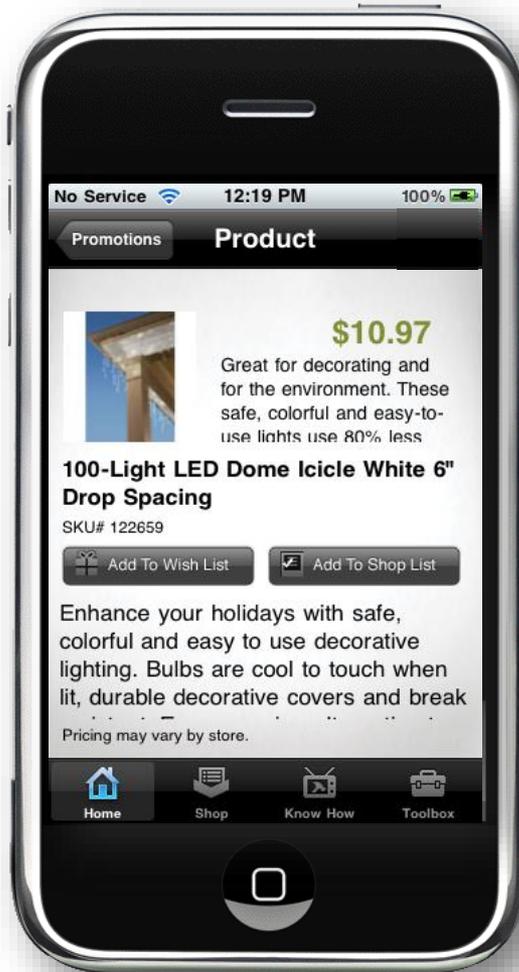
**This is different than
mobilizing the back
office system.**

Use Case #1 – Purchase Order



Use Case #2 – Inventory Inquiry

B2C
Customer
View



B2B
Employee
View



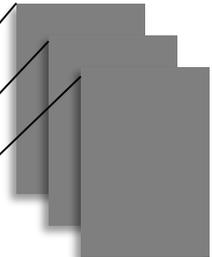
Native

Adoption

ROI



**Up to 3 Templates
For each Function**



**Features
Compliment
Usability**



Functions

Empowering Business to Everyone

- Single platform for all B2 activity
- Increases productivity and ROI
- Rapid deployment
- Leverage existing hardware
- Pre-packaged mobile apps
- Expandable solution
- Current technology
- Experienced designed team
- Complete services capability



Packaged Mobile Products with...

User Experience matched to the user

User Experience matched to the device

“Tell me what I need to know...”

Answer “Why would I download your app?”

- Amazing, Productive Apps

- Enable Beneficial, Compelling Capabilities

Support the functional process

Leverage device capabilities

Smartphones

smartphone - noun [C]

› a mobile phone that can be used as a small computer and that connects to the internet

78% of the US population now have a smartphone

54% of the 55-64 age group own a smartphone

91% of smartphones operate via IOS and Android

68% of all website traffic is accessed via a mobile device

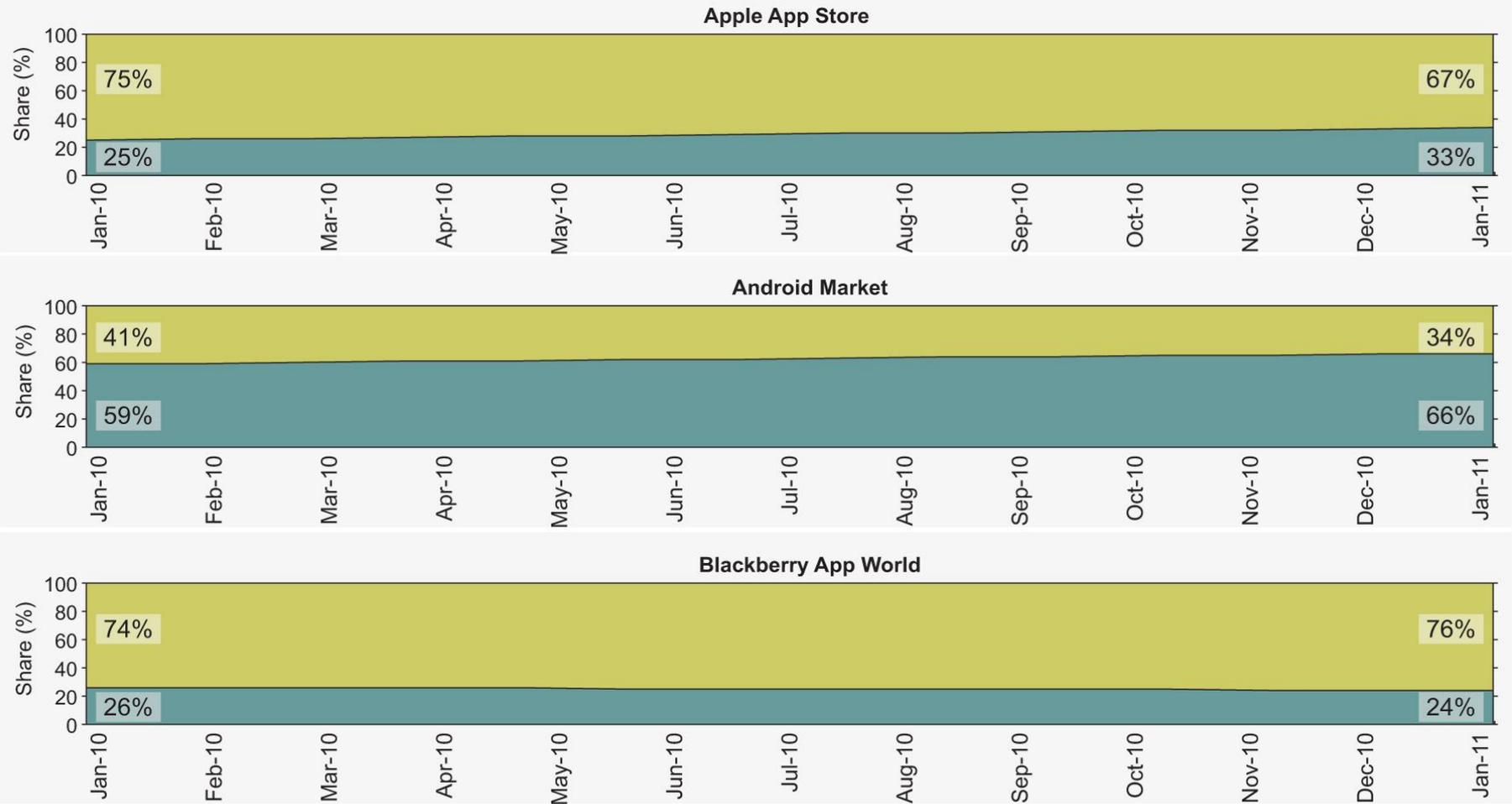
6.8 billion people on the planet, 3.5 billion use a toothbrush, 4 billion use a smartphone!

More iPhones are sold per minute than babies are born!



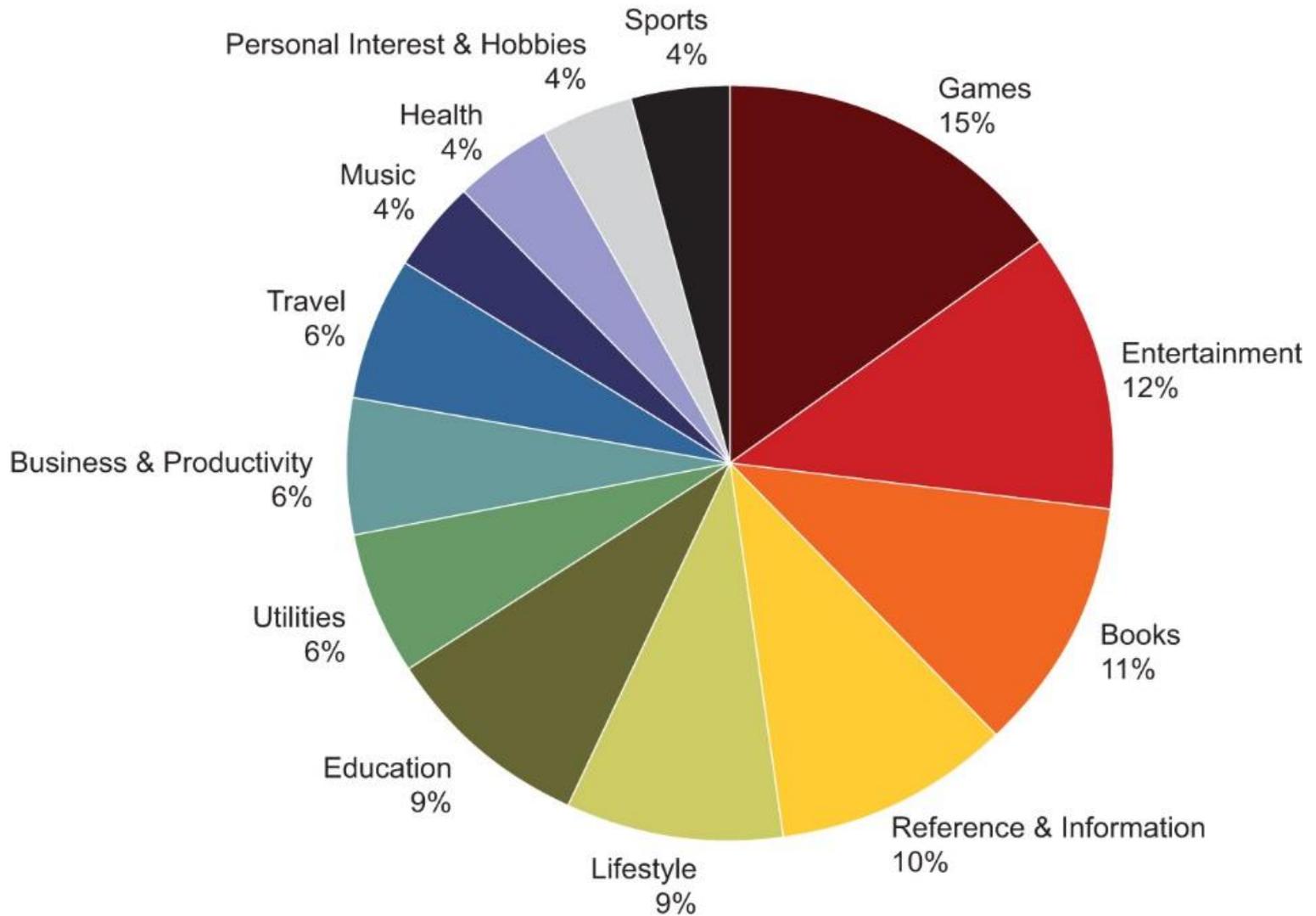
Free Vs. paid-for application availability, Apple App Store, Android Market, Blackberry App World, Jan 2010 to Jan 2011

■ Paid ■ Free

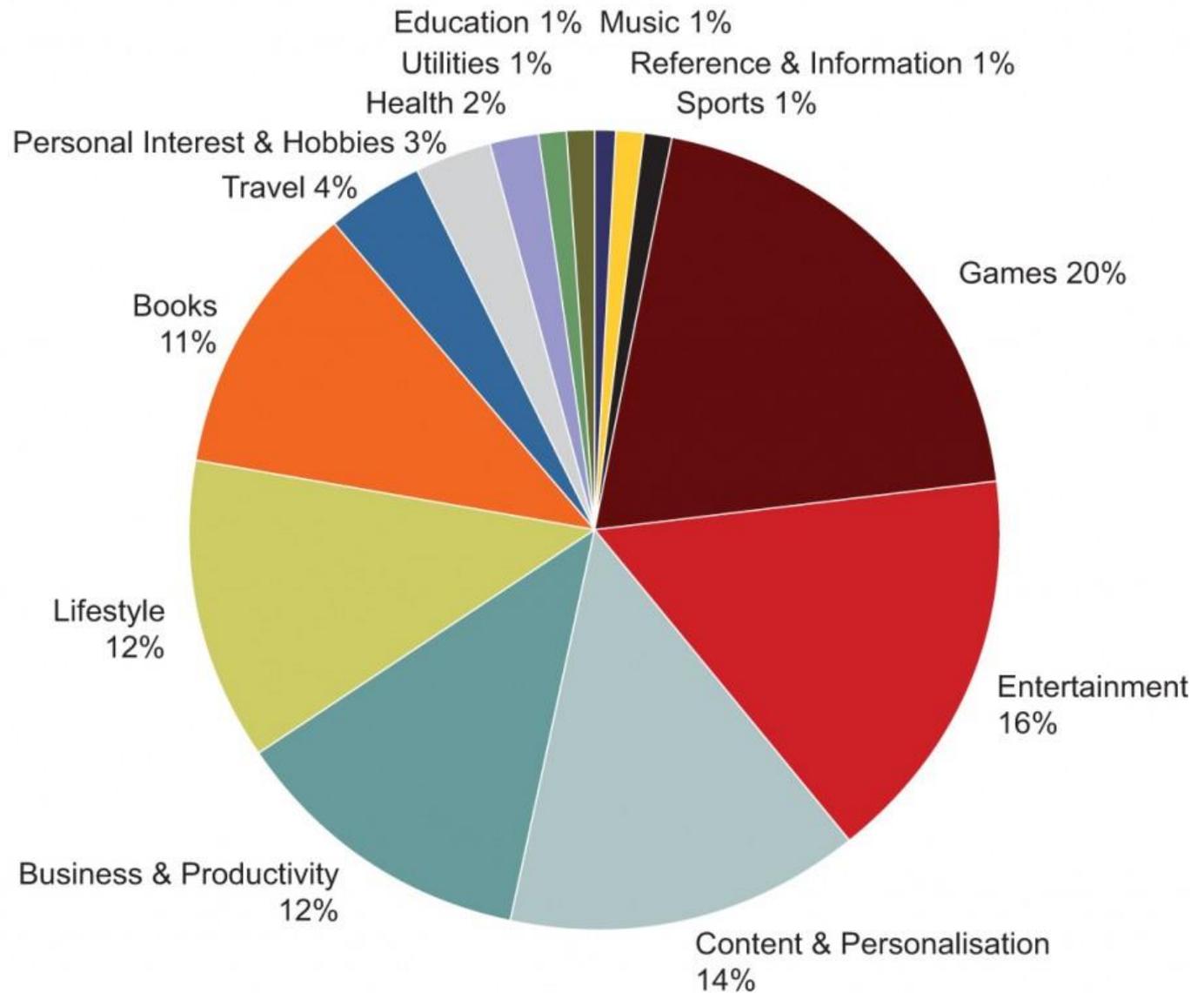


Source: Informa Telecoms & Media

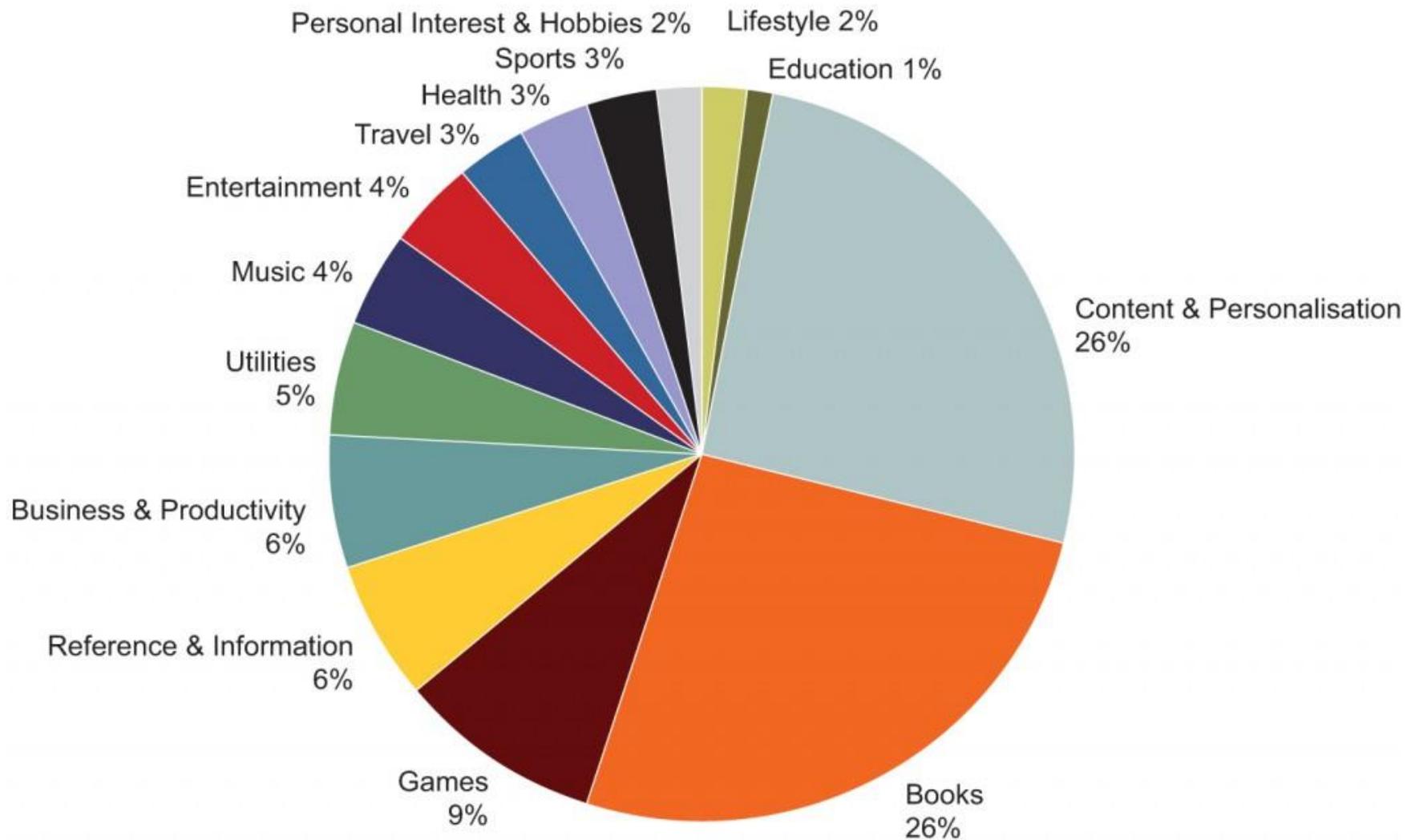
Apple App Store content by application category, Feb 2011



Android Market content by application category, Feb 2011



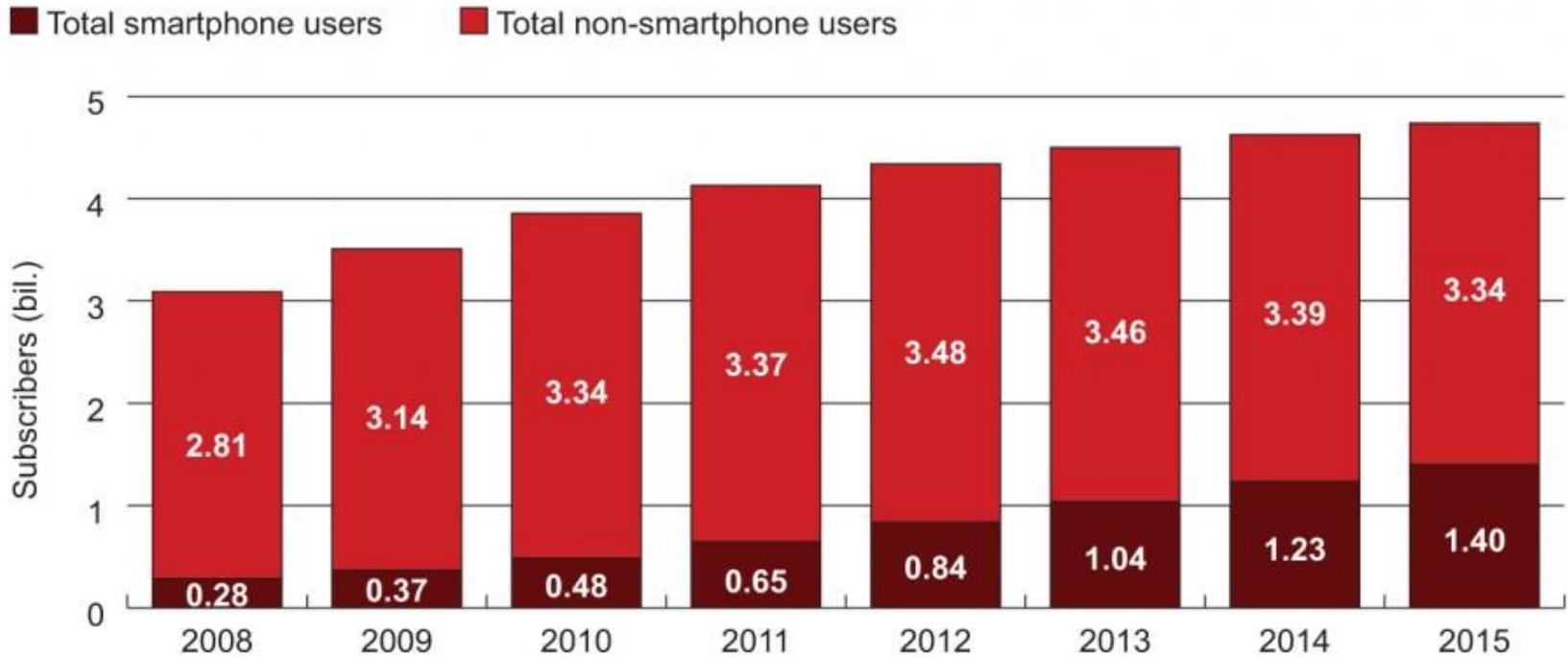
Blackberry App World content by application category, Feb 2011



Long-Term Evolution (LTE 4G) Subscriptions

LTE subscriptions by region, 2010, 2011 and 2015			
Region	Dec 31, 2010	Dec 31, 2011	Dec 31, 2015
Africa	–	166,000	12,982,000
Americas	–	19,000	24,467,700
Asia Pacific	1,200	1,565,400	128,716,600
Europe: Eastern	3,600	161,300	18,661,700
Europe: Western	8,500	1,311,400	64,789,300
Middle East	–	24,600	8,795,000
USA/Canada	65,000	2,308,000	67,264,700
Total	78,300	5,555,700	325,677,000
<i>Source: Informa Telecoms & Media</i>			

Global mobile subscribers, by smartphone and non-smartphone users, 2008-2015



Note: Figure refer to year-end
Source: Informa Telecoms and Media

Content Management System (CMS)



Live Customer Map

Imagine being able to see where your customers are in real time, right now!

Perhaps they're currently at a sports stadium, in the park, at a competitors store, or shopping at a nearby mall?

App enable business owners to see where they are in real time and easily create and send an instant location-based message to their customers.

The real-time message could include a special offer to tempt a customer that is currently nearby, to pay them a visit.

The result is higher foot traffic, new revenue opportunities and increased customer loyalty.



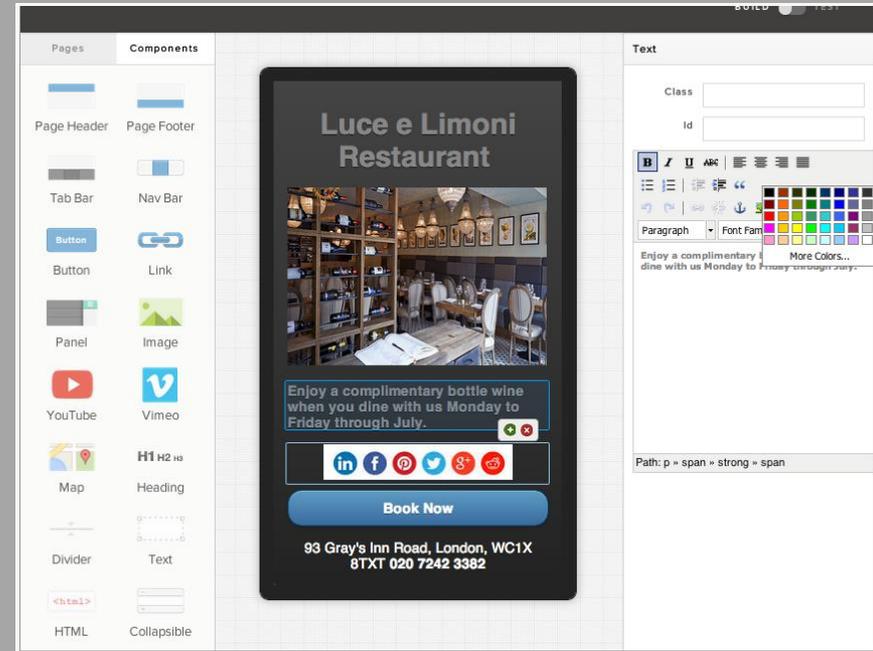
Rich Push Creation

Create and send powerful mobile marketing messages using an easy to use drag-and-drop editor.

These messages may include

- Text
- Video
- Photo
- Map
- Share Bar
- Link Button

Create a bank of message templates, branded and ready to go with a text edit and a new image.



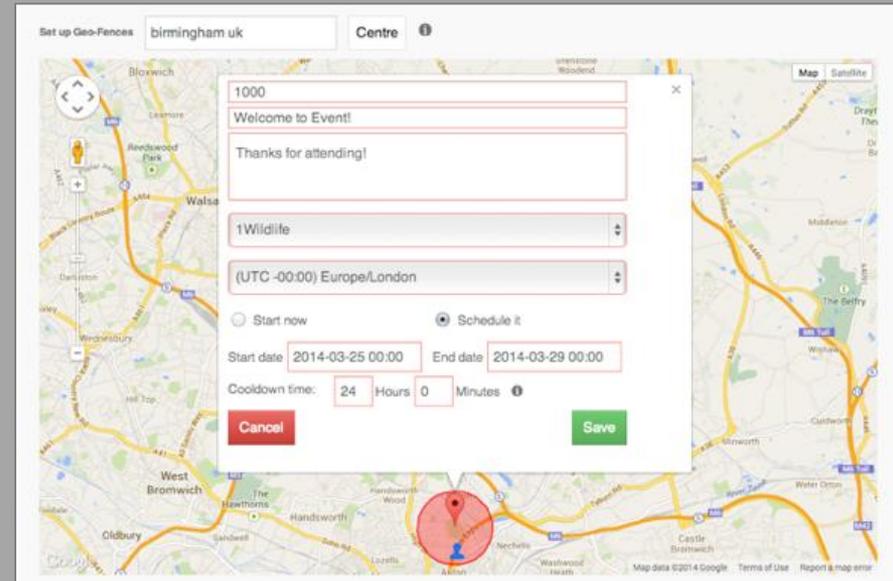
Geo-Fencing

A Geo-fence is a virtual perimeter around a real world location.



Add a Geo-Fence around a specific area e.g. location/event/retailer/restaurant. When an app user walks through this virtual perimeter, your pre-created rich message will pop-up automatically on the users phone.

You can use the Geo-fence feature to deliver offers to your users based on their 'real world' location; perhaps offering them a special discount when they walk past their shop.



iBeacons

An iBeacon is a small blue tooth device that is able to trigger notifications via blue tooth, to a smart phone that is located within its close proximity, between 1-150ft.

iBeacons enable businesses to notify a nearby phone with content containing vouchers, loyalty or sales messages to their app users.

While Geofencing is great for outdoor location-based marketing, iBeacons bring that functionality indoor.

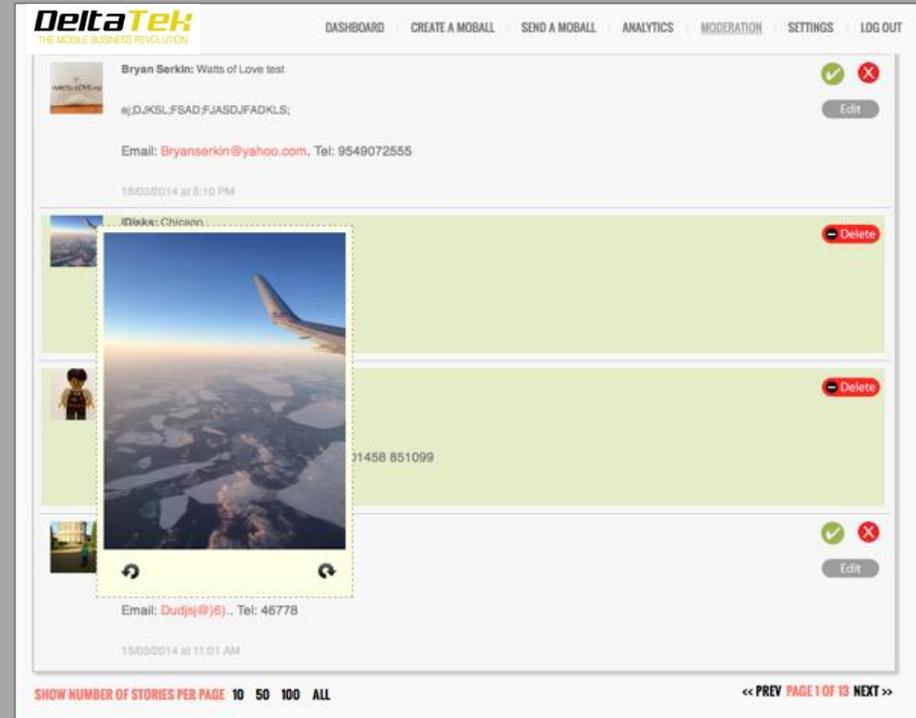


User Generated Content & Moderation

Keeping your community engaged with your brand is obviously incredibly important. User generated content (UGC) is extremely valuable and mobile is now the easiest way to do this.

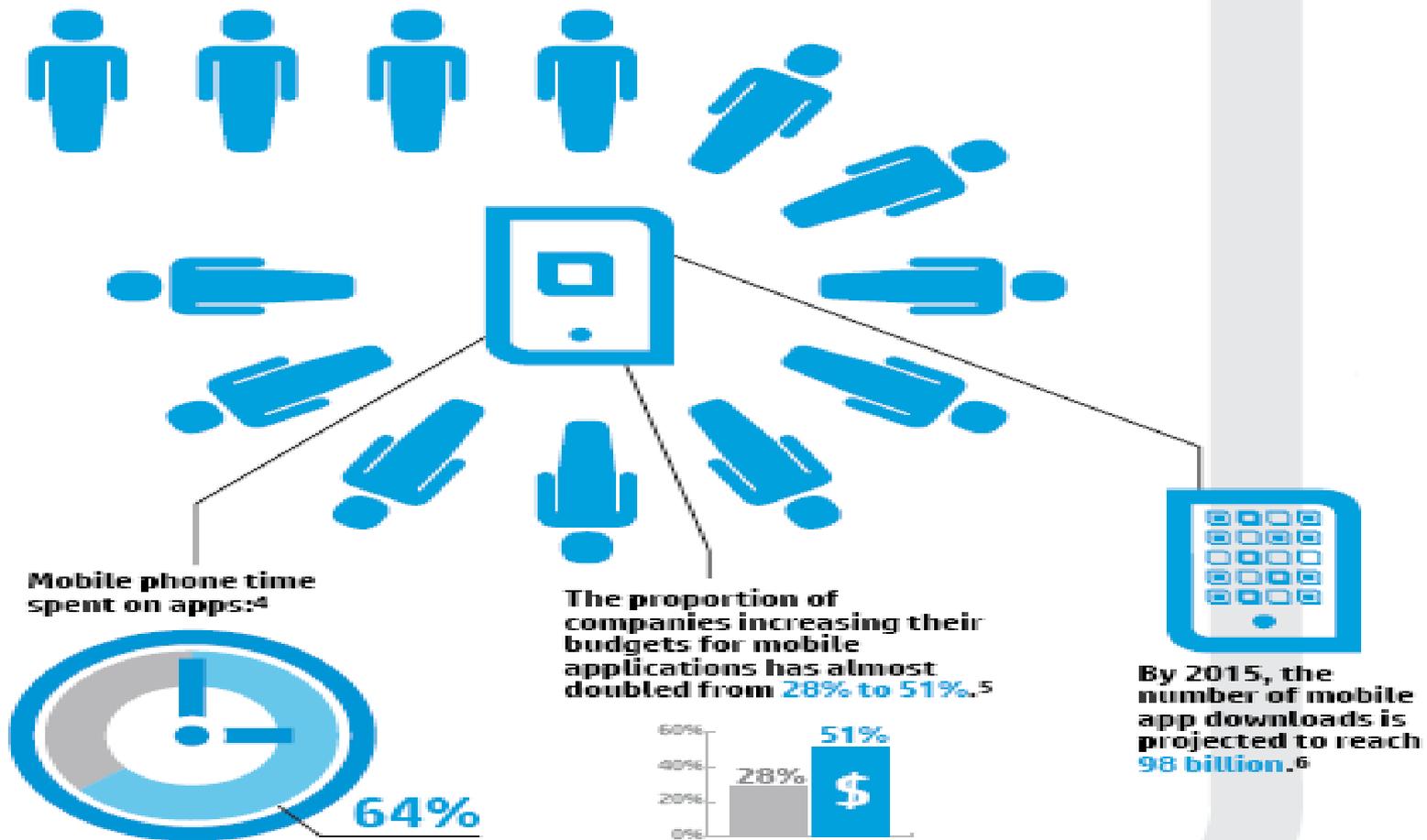
The management system makes it really easy for your app users to send you a photo or video directly from your app.

You can then approve the content in the moderation area. If approved, it's added to your app and social media connections automatically, so the wider community can like, share and engage with your brand.



Mobile Applications

Creating increased demand for mobile applications



Gartner Analysis



- According to market research firm [Gartner](#), 102 billion apps will be downloaded in 2013 (91% of them will be free) but they will still generate US\$26 billion, up 44.4% on 2012's US\$18 billion.

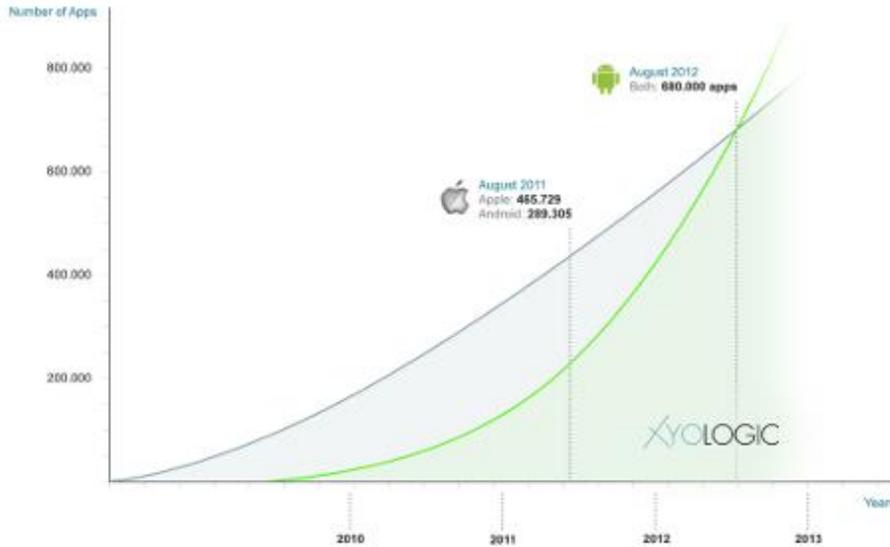
[Mobile apps revenues tipped to reach \\$26bn in 2013".](#)

The Guardian. 11 October 2013. Retrieved 19 September 2013

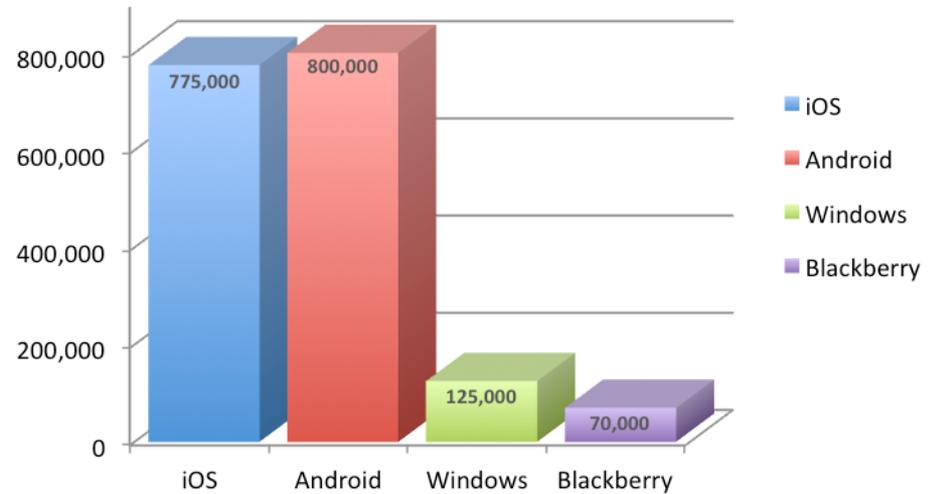
App Store vs Google Play

XOLOGIC

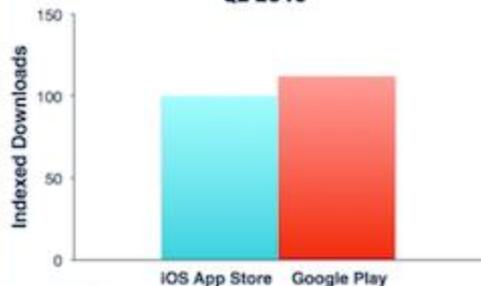
Apple vs. Android: Number of Apps
2008 - 2013



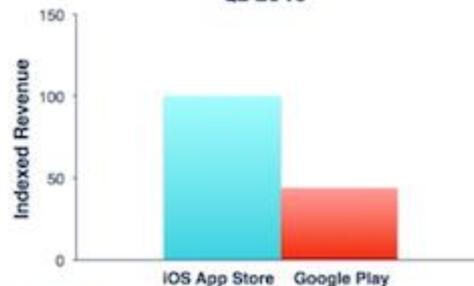
Apps Available by OS
March 2013



APP DOWNLOADS
Q2 2013



APP REVENUE
Q2 2013



App Store



Google play

App Annie

SOURCE: App Annie Intelligence

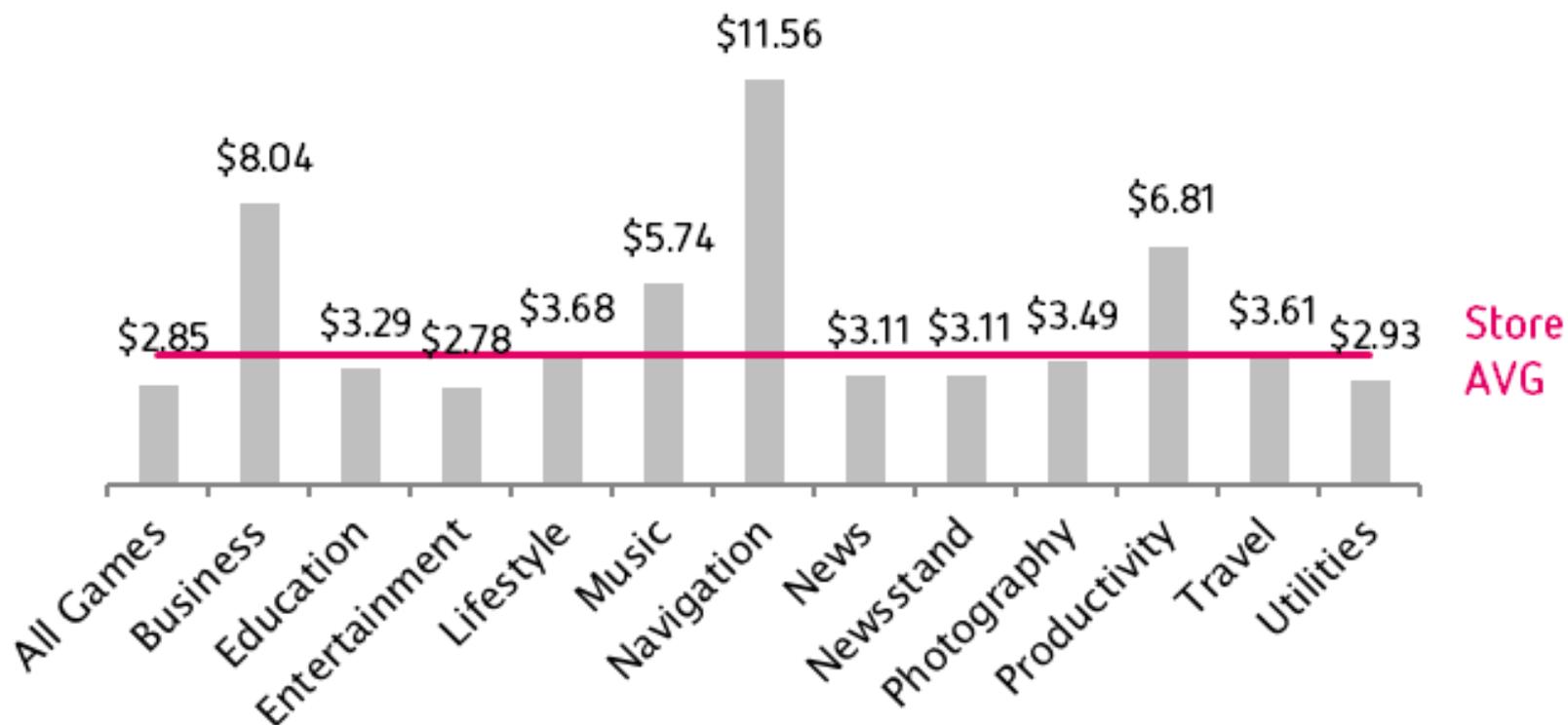
App Annie

SOURCE: App Annie Intelligence



Average Selling Prices In Each Category in 2012

DISTIMO



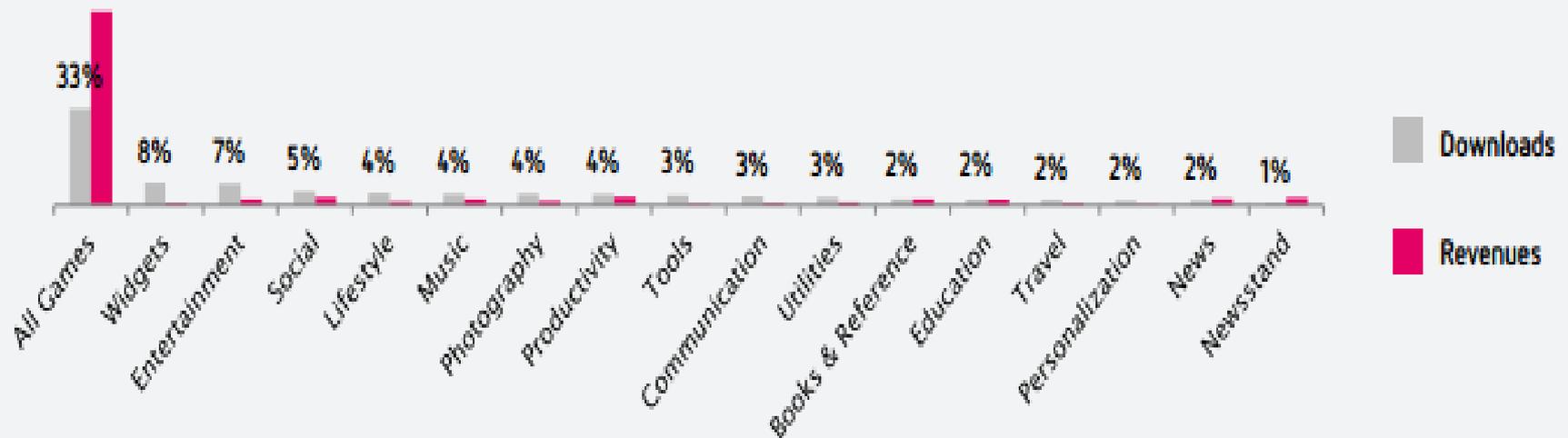
Distimo App Store Report Shows Apple And Google App ,techcrunch.com-

What are the most popular mobile app categories worldwide?

- According to AppAnnie, games accounted for about 40% of downloads and for about 70% and 80% of revenue, respectively, on the App Store and Google Play, during Q3 2013.
- However, Revenue from games on the iOS App Store dropped from 75% during Q2 2013 to 70% during Q3 2013, as a result of growth in social networking and navigation apps.

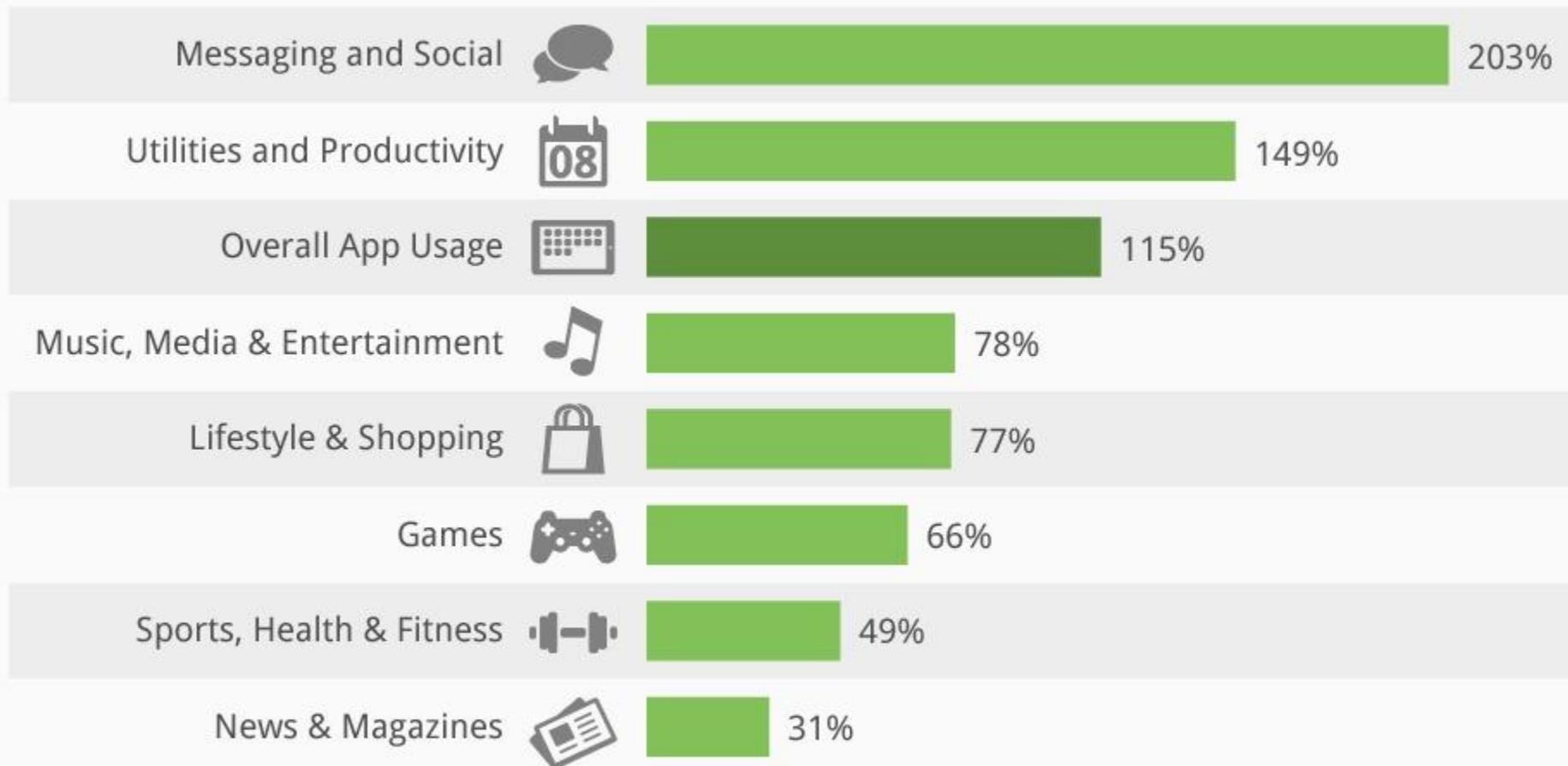
Downloads & Revenues Per Category

Apple App Store And Google Play Aggregated - Categories With Less Than 2% Excluded



Messaging & Social App Use Triples in 2013

Year-over-year growth of app usage, by category*



* app use defined as a consumer launching an app

Source: Flurry Analytics

iOS App Store: Top Categories in Q3 2013

Downloads			Revenue		
Rank	Category	Rank Change vs. Q2 2013	Rank	Category	Rank Change vs. Q2 2013
1	Games	-	1	Games	-
2	Entertainment	-	2	Social Networking	-
3	Photo & Video	-	3	Music	-
4	Utilities	▲ 1	4	Productivity	-
5	Lifestyle	▼ 1	5	Education	▲ 1

Google Play: Top Categories in Q3 2013

Downloads			Revenue		
Rank	Category	Rank Change vs. Q2 2013	Rank	Category	Rank Change vs. Q2 2013
1	Games	-	1	Games	-
2	Communication	-	2	Communication	-
3	Tools	-	3	Social	-
4	Entertainment	-	4	Travel & Local	-
5	Social	-	5	Tools	-

Social apps become the third highest App Store category in terms of revenue



Top Categories by Monthly Revenue iOS January 2013

Category	Rank Change vs. Jan 2012
1 Games	-
2 Productivity	-
3 Social Networking	▲ 9
4 Entertainment	▼ 1
5 Education	▼ 1
6 Music	▲ 1
7 Books	▼ 2
8 News	▲ 1
9 Photo and Video	▲ 4
10 Lifestyle*	▲ 1



SOURCE: App Annie Index™

<http://www.idownloadblog.com/2013/03/08/social-apps-fuel-app-store-earnings/>

6 Mobile Trends To Watch For In 2015

- Mobile payments
- Mobile integration with your home
- Wearable technology
- Mobile security
- Mobile web browsing
- Cloud integration

Mobile Application Development

- 10 common app development mistakes every small business owner should avoid
 - Underestimating costs.
 - Cutting corners to save money.
 - Neglecting social media.
 - Ignoring customer preferred OS.
 - Unclear on app monetization.
 - Frequently switching developers.
 - Neglecting app testing.
 - Minimizing the value of marketing.
 - Failing the dumb user test.
 - Adding too many features in one shot.

4 App monetization strategies for free apps

- In-App Advertising
- Freemium – Gated Features
- In-App Purchases
- Sponsorships – Incentivized Advertising

Why Develop Mobile Applications?

- Growth of global mobile phone subscribers
- Provide mobile phone users with applications that can keep them productive, informed, entertained, or connected whenever they feel the need
- Large potential for financial gain in the field of mobile applications
- Solve problems which have many challenges and obstacles

Mobile Application Development Challenges

- Development of mobile applications provides for many challenges and obstacles that are not commonly found in the development of applications for desktop computers
- The challenges faced by developers are found in:
 - Heterogeneity of mobile devices
 - Security
 - Network

Challenge: Mobile Devices

- Display/Screen Size
 - Mobile devices come in many different screen sizes
 - Consider the differentiating screen sizes between smartphones and cell phones
 - Smartphones offer the user a generally larger and higher resolution display screen, contrasted to cell phones which generally provide lower resolution and smaller display size

Challenge: Mobile Devices

- Memory
 - Just as screen size differs from device to device, the amount of available memory and differs from device to device
 - Developers must create applications which have a minimal memory footprint on the device while being of service to the user
 - Memory must also be carefully managed during the execution of any mobile application as it can potentially render the phone unusable until termination of the application

Challenge: Mobile Devices

- Processing Power
 - Another sign of the heterogeneity of mobile devices is the processing power
 - The CPUs differ from phone to phone and this must be taken into consideration by developers
 - Developers cannot create applications that require the user to wait an unreasonable amount of time for the service to load

Challenge: Mobile Devices

- Input Devices
 - The input devices on mobile devices range from full QWERTY keyboards to three letter button inputs
 - This means developers must take into account how much text is required by the user to input into their application and what kind of difficulties they may experience based on their device

Challenge: Network

- Transmission Errors
 - When creating mobile applications that utilize network connections there is a variety of issues that can effect the application
 - Wireless networks are exposed to interference which can alter the message received by the client or the server then what was originally sent
 - Applications must take into account these potential problems especially in financially sensitive services

Challenge: Network

- Message Latency
 - Messages that are to be sent to clients or servers can be delayed due to a variety of reasons such as overloaded network nodes or servers, dead or turned off cell phones, distance to travel
 - Applications must take this into account so as to avoid sending servers or clients stale information

Challenge: Network

- Bandwidth Usage
 - Wireless customers are forced to pay fees to access the wireless network and internet
 - While phones with WIFI capabilities allow for some users to have free connectivity at times it is important to keep messages to a minimum and compact
 - Applications that cost a lot to use will not be popular with many of the financially conscious users

Challenge: Security

- Wireless networks by default are not as secure as wired networks, it is important to note that message can be intercepted when travelling through the air
- Mobile applications must secure the sensitive data that is being transmitted over the air
- There are different methods to implement security but it must be relative to the information we want to secure and the resources that we wish to use for securing it

Solution: Mobile Devices

- Display/Screen Size

- There is no one single method to overcome to problem of different screen sizes however there are some ways to help

1: When dealing with graphics that should be placed on edges use methods which retrieve the edge of the display

2: When creating for a particular set of mobile devices (ie. Blackberry's, cell phones) create the layout to the smallest display size

Solution: Mobile Devices

- Memory
 - Compact data representation will help reduce the amount of memory it requires to load and use your application
 - Use optimization techniques to reduce the amount of code required to write your application
 - Compress any graphic images that you use in your application and save graphics in a format which takes the least space

Solution: Mobile Devices

- Processing Power
 - A result of reducing the memory consumption and footprint of the application should help time required to load applications
 - If the mobile application has a client-server architecture consider the partitioning of the application
 - Allow the server to do the brunt of the calculations and processing work and pass the information to the mobile device for less CPU intensive calculations

Solution: Mobile Devices

- Input Devices
 - To overcome some of the problems that can occur with the different input devices make input requirements concise, therefore the user should be able to perform the most common tasks in an application with the least amount of button presses
 - Provide users with menus when possible to help reduce the amount of button input required

Solution: Network

- Transmission Errors
 - Transmissions errors may be inevitable when dealing with wireless networks but there are some wireless network protocols than can correct or at the least detect these errors
 - One solution does not exist for every single type of transmission error that may occur, it is important to plan for these types of errors and be able to deal with them accordingly

Solution: Network

- Message Latency
 - In a client-server architecture the server can store messages that do not arrive at the mobile device and attempt to resend them at specific intervals
 - Servers can also store the message and send it when the mobile device reconnects to the system
 - Let the user know if they receive a message that can possibly be out of date or no longer valid, this could be done using timestamps

Solution: Network

- Bandwidth Usage
 - Pass as little messages as required between the client and the server
 - Keep the messages as short as possible, you can use symbols to represent commands for the server
 - If your application must use a lot of bandwidth at least notify the user of this fact

Solution: Security

- Important to implement security to a level which is appropriate for the data being exchanged
- Mobile devices, having limited processing power, cannot generate large cryptographic keys in a reasonable amount of time
- There has been research into creating keys for algorithms such as RSA and others and sending this to the mobile device to use but this is an area that is still developing

Mobile Application Development

- Knowing the challenges faced by developers with mobile applications we can look at the tools and steps developers take when creating applications
- Mobile application development differs from development of applications on desktops because mobile applications are developed on one platform and then deployed on a totally different platform
- This leads to many issues that developers face after moving their application to another platform and stresses an importance on testing

Task

- Research on one single mobile applications either iPhone or android
 - Product name
 - Describe product overview, Including App category
 - Describe product's promising features
 - Describe its advertising and revenue model?
- Give a “5 minutes presentation” by the end of the class.

References

- [1] Mahmoud, Qusay H., and Zakaria Maamar. "Engineering Wireless Mobile Applications." *Int. J. of Information Technology and Web Engineering* 1.1 (2006): 58-73.
- [2] Gunaratne, Ruchith. "Mobile Applications." hSenid Software International. <ruchith.files.wordpress.com/2006/11/mobile-computing-mobile-applications-1.ppt>
- [3] Global Mobile Phone Subscribers Expected to Reach 3.3 Billion by 2011. Market Intelligence Center. Taipei: Market Intelligence Center, 2007. 14 May 2008
<http://mic.iii.org.tw/english/press/research_PR.asp?func=press&Doc_sqno=4641>.
- [4] Kochnev, Dmitry S., and Andrey A. Terekhov. "Surviving Java for Mobiles." Ed. Sumi Helal. Pervasive Computing (2003): 90-95.

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- <http://yfsmagazine.com/2013/10/02/need-a-mobile-app-avoid-these-10-costly-mistakes/>
- <http://www.fastcompany.com/3027080/productivity-in-motion/6-mobile-trends-to-watch-for-in-2014>
- <http://www.rimnam.com/IT/Google-Glass.html>
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- [http://en.wikipedia.org/wiki/App Store \(iOS\)](http://en.wikipedia.org/wiki/App_Store_(iOS))
- [http://en.wikipedia.org/wiki/Mobile games](http://en.wikipedia.org/wiki/Mobile_games)
- [http://en.wikipedia.org/wiki/Google play](http://en.wikipedia.org/wiki/Google_play)